

## CLAIMS

### BASE STATION WITHOUT BASE DESCRAMBLER

1. A base station receiver system for recovering a plurality of data streams from a plurality of signals, each signal transmitted from a corresponding one of a plurality of remote units in a radio communication network, comprising:

a receiver coupled to receive said signals, said receiver forming an input data matrix;

a demultiplexer coupled to receive said input data matrix, said demultiplexer separating said input data matrix into a preamble data matrix and an information data matrix;

a matrix decomposition processor coupled to receive said preamble data matrix and providing a first decomposition matrix and a second decomposition matrix, wherein said first decomposition matrix is substantially orthogonal and said second decomposition matrix is substantially upper triangular;

a detector with an input for said first decomposition matrix and using a set of substantially orthogonal preamble vectors to provide a set of detected preamble correlation vectors, wherein said each detected preamble correlation vector corresponds to one of said plurality of remote units;

a weight vector generator coupled to receive said second decomposition matrix and said detected preamble correlation vectors and providing a set of weight vectors, wherein each of said weight vectors is computed using a corresponding one of said set of detected preamble correlation vectors; and

a despreader coupled to receive said information data matrix and said set of weight vectors and providing a set of despread symbol vectors, wherein each despread symbol vector corresponds to one of said plurality of remote units.

2. The base station receiver system of claim 1, wherein said matrix decomposition processor comprises a QR decomposition.

3. The base station receiver system of claim 1, wherein said QR decomposition is calculated according to a recursive algorithm.

4. The base station receiver system of claim 1, wherein said detector comprises:  
a correlator for providing a set of preamble correlation vectors, wherein each preamble correlation vector corresponds to a cross-correlation of said first decomposition matrix and a corresponding one of said set of preamble vectors; and

a selector for selecting said set of detected preamble correlation vectors from said set of preamble correlation vectors.

5. The base station receiver system of Claim 1, wherein said detector comprises:

5 a fast transform processor for producing a set of preamble correlation vectors, wherein said set of preamble vectors comprises a set of fast transform basis functions for said fast transform processor and each preamble correlation vector corresponds to a cross-correlation of said first decomposition matrix and a corresponding one of said set of fast transform basis functions; and

10 a selector for selecting said set of detected preamble correlation vectors from said set of preamble correlation vectors.

6. The base station receiver system of Claim 5, wherein:

said set of fast transform basis functions comprises a set of Hadamard basis functions;

15 and

said fast transform processor comprises a fast Hadamard transform.

7. The base station receiver system of Claim 5, wherein:

20 said set of fast transform basis functions comprises a set of fast Fourier transform basis functions; and

said fast transform processor comprises a fast Fourier transform.

8. The base station receiver system of Claim 7, wherein said detector further comprises:

25 a delay synchronizer for removing a delay offset using said fast Fourier transform.

9. The base station receiver system of Claim 5, wherein:

said set of fast transform basis functions comprises a set of Kronecker basis functions;

and

30 said fast transform processor comprises a fast Kronecker transform.

10. The base station receiver system of Claim 1, further comprising:

a decoder coupled to receive said set of despread symbol vectors and reproducing said plurality of data streams, wherein each data stream corresponds to one of said plurality of remote  
35 units.

11. The base station receiver system of Claim 1, further comprising:  
a delay equalizer coupled to receive said set of despread symbol vectors and producing a set of delay corrected symbol vectors, and

a decoder coupled to receive said set of delay corrected symbol vectors and reproducing  
5 a plurality of data streams, wherein each data stream corresponds to one of said plurality of remote units.

12. The base station receiver system of Claim 1, wherein:  
said set of weight vectors are updated in accordance with an adaptive algorithm.

10 13. A base station receiver system for recovering a plurality of data streams from a plurality of signals, each signal transmitted from a corresponding one of a plurality of remote units in a radio communication network, comprising:

a receiver coupled to receive said signals, said receiver forming an input data matrix;

15 a demultiplexer coupled to receive said input data matrix, said demultiplexer separating said input data matrix into a preamble data matrix and an information data matrix;

a matrix decomposition processor coupled to receive said preamble data matrix and providing a first decomposition matrix and a second decomposition matrix, wherein said first decomposition matrix is substantially orthogonal and said second decomposition matrix is  
20 substantially upper triangular;

a multiplier using element by element multiplication of a base code vector with said first decomposition matrix and providing a descrambled matrix;

a detector with an input for said descrambled matrix and using a set of substantially orthogonal preamble vectors to provide a set of detected preamble correlation vectors, wherein  
25 said each detected preamble correlation vector corresponds to one of said plurality of remote units;

a weight vector generator coupled to receive said second decomposition matrix and said detected preamble correlation vectors and providing a set of weight vectors, wherein each of said weight vectors is computed using a corresponding one of said set of detected preamble  
30 correlation vectors; and

a despreader coupled to receive said information data matrix and said set of weight vectors and providing a set of despread symbol vectors, wherein each detected despread symbol vector corresponds to one of said plurality of remote units.

14. The base station receiver system of claim BR2, wherein said matrix decomposition processor comprises a QR decomposition.

15. The base station receiver system of claim 13, wherein said QR decomposition is  
5 calculated according to a recursive algorithm.

16. The base station receiver system of claim 13, wherein said detector comprises:  
a correlator for providing a set of preamble correlation vectors, wherein each preamble  
correlation vector corresponds to a cross-correlation of said descrambled matrix and a  
10 corresponding one of said set of preamble vectors; and

a selector for selecting said set of detected preamble correlation vectors from said set of  
preamble correlation vectors.

17. The base station receiver system of Claim 13, wherein said detector comprises:  
15 a fast transform processor for producing a set of preamble correlation vectors, wherein  
said set of preamble vectors comprises a set of fast transform basis functions for said fast  
transform processor and each preamble correlation vector corresponds to a cross-correlation of  
said descrambled matrix and a corresponding one of said set of fast transform basis functions;  
and

20 a selector for selecting said set of detected preamble correlation vectors from said set of  
preamble correlation vectors.

18. The base station receiver system of Claim 17, wherein:  
said set of fast transform basis functions comprises a set of Hadamard basis functions;  
25 and  
said fast transform processor comprises a fast Hadamard transform.

19. The base station receiver system of Claim 17, wherein:  
said set of fast transform basis functions comprises a set of fast Fourier transform basis  
30 functions; and  
said fast transform processor comprises a fast Fourier transform.

20. The base station receiver system of Claim 19, wherein said detector further  
comprises:  
35 a delay synchronizer for removing a delay offset using said fast Fourier transform.

21. The base station receiver system of Claim 17, wherein:  
said set of fast transform basis functions comprises a set of Kronecker basis functions;

and

5 said fast transform processor comprises a fast Kronecker transform.

22. The base station receiver system of Claim 17, further comprising:

a decoder coupled to receive said set of despread symbol vectors and reproducing said  
plurality of data streams, wherein each data stream corresponds to one of said plurality of remote  
10 units.

23. The base station receiver system of Claim 17, further comprising:

a delay equalizer coupled to receive said set of despread symbol vectors and producing a  
set of delay corrected symbol vectors, and

15 a decoder coupled to receive said set of delay corrected symbol vectors and reproducing  
a plurality of data streams, wherein each data stream corresponds to one of said plurality of  
remote units.

24. The base station receiver system of Claim 17, wherein:

20 said set of weight vectors are updated in accordance with an adaptive algorithm.

25. A remote unit receiver system for recovering a data stream from a signal  
transmitted from a base station in a radio communication network, comprising:

a receiver coupled to received said signal, said receiver forming an input data matrix;

25 a demultiplexer having an input coupled to receive said input data matrix, wherein said  
demultiplexer separates said input data matrix into a preamble data matrix and an information  
data matrix;

a matrix decomposition processor coupled to receive said preamble data matrix and  
providing a first decomposition matrix and a second decomposition matrix wherein said first  
30 decomposition matrix is substantially orthogonal and said second decomposition matrix is  
substantially upper triangular;

a correlator coupled to receive said first decomposition matrix and providing a correlation  
vector, wherein said correlation vector is a cross-correlation of said first decomposition matrix  
and a preamble vector uniquely associated with said remote unit;

a weight vector generator coupled to receive said second decomposition matrix and said correlation vector and providing a weight vector; and

a despreader coupled to receive said information data matrix and said weight vector and providing a despread symbol vector.

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26. The remote unit receiver system of Claim 25 wherein:

said set of preamble vectors comprises a set of fast transform basis functions with a corresponding fast transform.

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27. The remote unit receiver system of Claim 26, wherein:

said set of fast transform basis functions comprises a set of Hadamard basis functions.

28. The remote unit receiver system of Claim 26, wherein:

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said set of fast transform basis functions comprises a set of fast Fourier transform basis functions.

29. The remote unit receiver system of Claim 26, wherein:

said set of fast transform basis functions comprises a set of Kronecker basis functions.

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30. The remote unit receiver system of Claim 26, further comprising:

a decoder for reproducing said data stream from said despread symbol vector.

31. The remote unit receiver system of Claim 25, wherein:

said weight vector is updated in accordance with an adaptive algorithm.

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32. A method for communicating a data stream from a base unit to a destination remote unit in a radio communication network, comprising the steps of:

mapping said data stream to a sequence of information symbols;

selecting a unique preamble for said destination remote unit;

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concatenating said preamble with said sequence of information symbols to form a concatenated signal;

spreading said concatenated signal using a base spreading weight vector associated with said destination remote unit to form a spread signal;

transmitting said spread signal;

35

receiving said spread signal at said destination remote unit to form an input data matrix;

separating said input data matrix into a preamble data matrix and an information data matrix;

detecting said preamble in said preamble data matrix; and

applying a remote unit despreading weight vector to said information data matrix to form  
5 a sequence of information symbol estimates.

33. A method as claimed in claim 32, further comprising the step of:  
recovering said data stream from said sequence of information symbol estimates.

10 34. A method as claimed in claim 32, wherein:  
said preamble is selected from a set of substantially orthogonal preambles.

35. A method as claimed in claim 32, wherein:  
said preamble is selected from a set of fast transform basis functions with a corresponding  
15 fast transform.

36. A method as claimed in claim 35, wherein:  
said set of fast transform basis functions comprise a set of fast Fourier transform basis  
functions; and  
20 said corresponding fast transform comprises a fast Fourier transform.

37. A method as claimed in claim 25, wherein:  
said set of fast transform basis functions comprise a set of Hadamard transform basis  
functions; and  
25 said corresponding fast transform comprises a fast Hadamard transform.

38. A method as claimed in claim 35, wherein:  
said set of fast transform basis functions comprise a set of Kronecker transform basis  
functions; and  
30 said corresponding fast transform comprises a fast Kronecker transform.

39. A method as claimed in claim 32, further comprising the step of:  
initializing said base spreading weight vector in response to an initiation signal  
transmitted from said destination remote unit.

40. A method as claimed in claim 39, wherein said initializing step occurs before said spreading step.

41. A method as claimed in claim 39, wherein the step of detecting said preamble,  
5 further comprises the steps of:

decomposing said preamble data matrix into a first decomposition matrix and a second decomposition matrix, wherein said first decomposition matrix is substantially orthogonal and said second decomposition matrix is substantially upper triangular; and

correlating said first decomposition matrix with said preamble to form a correlation  
10 vector.

42. A method as claimed in claim 41, wherein the step of decomposing said preamble data matrix comprises a QR decomposition.

43. A method as claimed in claim 42, wherein said QR decomposition is calculated  
15 according to a recursive algorithm.

44. A method as claimed in claim 41, further comprising the step of:  
generating said remote unit despreading weight vector using said second decomposition  
20 matrix and said correlation vector.

45. A method as claimed in claim 32, further comprising the step of:  
updating said remote unit despreading weight vector using an adaptive algorithm.

46. A method as claimed in claim 32, further comprising the steps of:  
calculating a norm of said base spreading weight vector;  
comparing said norm to a predetermined range, said range having a lower threshold and  
25 an upper threshold;  
increasing a gain of said base spreading weight vector if said norm is less than said lower  
30 threshold; and  
decreasing said gain of said base spreading weight vector if said norm is greater than said  
upper threshold.

47. A method as claimed in claim 36, further comprising the steps of:  
35 transmitting a power control message to said destination remote unit;  
receiving said power control message at said destination remote unit;



adjusting said remote unit despreading weight vector in accordance with said power control message; and

adjusting a remote unit spreading weight vector in accordance with said power control message.

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48. A method as claimed in claim 47, wherein:

increasing said gain of said base spreading weight vector comprises multiplying by a predetermined factor;

10 said power control message is a decrease power message if said norm is less than said lower threshold;

adjusting said remote unit despreading weight vector comprises multiplying by an inverse of said predetermined factor if said power control message is said decrease power message;

adjusting said remote unit spreading weight vector comprises multiplying by said inverse of said predetermined factor if said power control message is a decrease power message;

15 decreasing said gain of said base spreading weight vector comprises multiplying by said inverse of said predetermined factor;

said power control message is an increase power message if said norm is greater than said upper threshold;

20 adjusting said remote unit despreading weight vector comprises multiplying by said predetermined factor if said power control message is an increase power message; and

adjusting said remote unit spreading weight vector comprises multiplying by said predetermined factor if said power control message is an increase power message.

25 49. A base station receiver system for recovering a plurality of data streams from a plurality of signals, each signal transmitted from a corresponding one of a plurality of remote units in a radio communication network and each signal having a preamble portion and an information data portion, comprising:

30 a receiver coupled to receive said signals, said receiver forming an input data matrix with a preamble portion corresponding to said preamble portion of said signals and an information data portion corresponding to said information data portion of said signals;

a matrix decomposition processor coupled to receive said preamble data portion of said input data matrix and providing a first decomposition matrix and a second decomposition;

a detector with an input for said first decomposition matrix and using a set of substantially orthogonal preamble vectors to provide a set of detected preamble correlation

vectors, wherein said each detected preamble correlation vector corresponds to one of said plurality of remote units;

a weight vector generator coupled to receive said second decomposition matrix and said detected preamble correlation vectors and providing a set of weight vectors, wherein each of said weight vectors is computed using a corresponding one of said set of detected preamble correlation vectors; and

a despreader coupled to receive said information data portion of said input data matrix and said set of weight vectors and providing a set of despread symbol vectors, wherein each despread symbol vector corresponds to one of said plurality of remote units.

50. A method as claimed in claim 49, wherein:

said first decomposition matrix is substantially orthogonal and said second decomposition matrix is substantially upper triangular.

51. The base station receiver system of claim 49, wherein said matrix decomposition processor comprises a QR decomposition.

52. The base station receiver system of claim 49, wherein said QR decomposition is calculated according to a recursive algorithm.

53. The base station receiver system of claim 49, wherein said detector comprises:  
a correlator for providing a set of preamble correlation vectors, wherein each preamble correlation vector corresponds to a cross-correlation of said first decomposition matrix and a corresponding one of said set of preamble vectors; and

a selector for selecting said set of detected preamble correlation vectors from said set of preamble correlation vectors.

54. The base station receiver system of Claim 49, wherein said detector comprises:  
a fast transform processor for producing a set of preamble correlation vectors, wherein said set of preamble vectors comprises a set of fast transform basis functions for said fast transform processor and each preamble correlation vector corresponds to a cross-correlation of said first decomposition matrix and a corresponding one of said set of fast transform basis functions; and

a selector for selecting said set of detected preamble correlation vectors from said set of preamble correlation vectors.

55. The base station receiver system of Claim 54, wherein:  
said set of fast transform basis functions comprises a set of Hadamard basis functions;  
and  
said fast transform processor comprises a fast Hadamard transform.

56. The base station receiver system of Claim 54, wherein:  
said set of fast transform basis functions comprises a set of fast Fourier transform basis  
functions; and  
said fast transform processor comprises a fast Fourier transform.

57. The base station receiver system of Claim 56, wherein said detector further  
comprises:  
a delay synchronizer for removing a delay offset using said fast Fourier transform.

58. The base station receiver system of Claim 54, wherein:  
said set of fast transform basis functions comprises a set of Kronecker basis functions;  
and  
said fast transform processor comprises a fast Kronecker transform.

59. The base station receiver system of Claim 49, further comprising:  
a decoder coupled to receive said set of despread symbol vectors and reproducing said  
plurality of data streams, wherein each data stream corresponds to one of said plurality of remote  
units.

60. The base station receiver system of Claim 49, further comprising:  
a delay equalizer coupled to receive said set of despread symbol vectors and producing a  
set of delay corrected symbol vectors, and  
a decoder coupled to receive said set of delay corrected symbol vectors and reproducing  
a plurality of data streams, wherein each data stream corresponds to one of said plurality of  
remote units.

61. The base station receiver system of Claim 49, wherein:  
said set of weight vectors are updated in accordance with an adaptive algorithm.

62. A base station receiver system for recovering a plurality of data streams from a plurality of signals, each signal transmitted from a corresponding one of a plurality of remote units in a radio communication network and each signal having a preamble portion and an information data portion, comprising:

5 a receiver coupled to receive said signals, said receiver forming an input data matrix with a preamble portion corresponding to said preamble portion of said signals and an information data portion corresponding to said information data portion of said signals;

a matrix decomposition processor coupled to receive said preamble portion of said input data matrix and providing a first decomposition matrix and a second decomposition matrix;

10 a multiplier using element by element multiplication of a base code vector with said first decomposition matrix and providing a descrambled matrix;

a detector with an input for said descrambled matrix and using a set of substantially orthogonal preamble vectors to provide a set of detected preamble correlation vectors, wherein said each detected preamble correlation vector corresponds to one of said plurality of remote units;

15 a weight vector generator coupled to receive said second decomposition matrix and said detected preamble correlation vectors and providing a set of weight vectors, wherein each of said weight vectors is computed using a corresponding one of said set of detected preamble correlation vectors; and

20 a despreader coupled to receive said information data portion of said input data matrix and said set of weight vectors and providing a set of despread symbol vectors, wherein each detected despread symbol vector corresponds to one of said plurality of remote units.

Dependent claims are analogous to those for BR3, but with descrambled matrix instead of first decomposition matrix ...

25 63. A method as claimed in claim 62, wherein:

said first decomposition matrix is substantially orthogonal and said second decomposition matrix is substantially upper triangular.

30 64. The base station receiver system of claim 62, wherein said matrix decomposition processor comprises a QR decomposition.

65. The base station receiver system of claim 62, wherein said QR decomposition is calculated according to a recursive algorithm.

66. The base station receiver system of claim 62, wherein said detector comprises:  
a correlator for providing a set of preamble correlation vectors, wherein each preamble correlation vector corresponds to a cross-correlation of said descrambled matrix and a corresponding one of said set of preamble vectors; and

5 a selector for selecting said set of detected preamble correlation vectors from said set of preamble correlation vectors.

67. The base station receiver system of Claim 62, wherein said detector comprises:  
a fast transform processor for producing a set of preamble correlation vectors, wherein  
10 said set of preamble vectors comprises a set of fast transform basis functions for said fast transform processor and each preamble correlation vector corresponds to a cross-correlation of said descrambled matrix and a corresponding one of said set of fast transform basis functions;  
and

15 a selector for selecting said set of detected preamble correlation vectors from said set of preamble correlation vectors.

68. The base station receiver system of Claim 67, wherein:  
said set of fast transform basis functions comprises a set of Hadamard basis functions;  
and  
20 said fast transform processor comprises a fast Hadamard transform.

69. The base station receiver system of Claim 67, wherein:  
said set of fast transform basis functions comprises a set of fast Fourier transform basis functions; and  
25 said fast transform processor comprises a fast Fourier transform.

70. The base station receiver system of Claim 69, wherein said detector further comprises:  
a delay synchronizer for removing a delay offset using said fast Fourier transform.

71. The base station receiver system of Claim 67, wherein:  
said set of fast transform basis functions comprises a set of Kronecker basis functions;  
and  
said fast transform processor comprises a fast Kronecker transform.

72. The base station receiver system of Claim 62, further comprising:  
a decoder coupled to receive said set of despread symbol vectors and reproducing said plurality of data streams, wherein each data stream corresponds to one of said plurality of remote units.

73. The base station receiver system of Claim 62, further comprising:  
a delay equalizer coupled to receive said set of despread symbol vectors and producing a set of delay corrected symbol vectors, and

a decoder coupled to receive said set of delay corrected symbol vectors and reproducing a plurality of data streams, wherein each data stream corresponds to one of said plurality of remote units.

74. The base station receiver system of Claim 62, wherein:  
said set of weight vectors are updated in accordance with an adaptive algorithm.

75. A remote unit receiver system for recovering a data stream from a signal transmitted from a base station in a radio communication network, said signal having a preamble portion and an information data portion, comprising:

a receiver coupled to received said signal, said receiver forming an input data matrix with a preamble portion corresponding to said preamble portion of said signal and an information data portion corresponding to said information data portion of said signal;

a matrix decomposition processor coupled to receive said preamble portion of said input data matrix and providing a first decomposition matrix and a second decomposition;

a correlator coupled to receive said first decomposition matrix and providing a correlation vector, wherein said correlation vector is a cross-correlation of said first decomposition matrix and a preamble vector uniquely associated with said remote unit;

a weight vector generator coupled to receive said second decomposition matrix and said correlation vector and providing a weight vector; and

a despreader coupled to receive said information data portion of said input data matrix and said weight vector and providing a despread symbol vector.

76. A method as claimed in claim 75, wherein:  
said first decomposition matrix is substantially orthogonal and said second decomposition matrix is substantially upper triangular.

77. The remote unit receiver system of Claim 75 wherein:  
said set of preamble vectors comprises a set of fast transform basis functions with a  
corresponding fast transform.

5 78. The remote unit receiver system of Claim 77, wherein:  
said set of fast transform basis functions comprises a set of Hadamard basis functions.

79. The remote unit receiver system of Claim 77, wherein:  
said set of fast transform basis functions comprises a set of fast Fourier transform basis  
10 functions.

80. The remote unit receiver system of Claim 77, wherein:  
said set of fast transform basis functions comprises a set of Kronecker basis functions.

15 81. The remote unit receiver system of Claim 75, further comprising:  
a decoder for reproducing said data stream from said despread symbol vector.

82. The remote unit receiver system of Claim 75, wherein:  
said weight vector is updated in accordance with an adaptive algorithm.

20 83. A method for communicating a plurality of data streams from a base unit to a  
plurality of remote units in a radio communication network, each one of said plurality of data  
streams being destined for a corresponding one of said plurality of remote units, comprising the  
steps of:

25 converting said plurality of data streams into a plurality of signal vectors, wherein each  
signal vector comprises a sequence of information symbols and a preamble associated with a  
corresponding one of said plurality of remote units;

spreading said plurality of signal vectors using a plurality of base spreading weight  
vectors to form a composite spread signal, wherein each one of said plurality of base spreading  
30 weight vectors is associated with a corresponding one of said plurality of remote units and is  
applied to the signal vector destined for said corresponding remote unit;

transmitting said composite spread signal;

receiving said composite spread signal at each one of said plurality of remote units;

forming an input data matrix at each remote unit, wherein said input data matrix

35 comprises a preamble portion and an information data portion;

detecting at each remote unit said associated preamble for said remote unit in said preamble portion; and

applying a remote unit despreading weight vector at each remote unit to said information data portion to reconstruct said sequence of information symbols corresponding to said remote unit.

84. A method as claimed in claim 83, further comprising the step of:  
recovering said data stream corresponding to said remote unit from said reconstructed sequence of information symbols at each remote unit.

85. A method as claimed in claim 83, wherein:  
said preamble associated with said corresponding one of said plurality of remote units is selected from a set of substantially orthogonal preambles.

86. A method as claimed in claim 83, wherein:  
said preamble associated with said corresponding one of said plurality of remote units is selected from a set of fast transform basis functions with a corresponding fast transform.

87. A method as claimed in claim 86, wherein:  
said set of fast transform basis functions comprise a set of fast Fourier transform basis functions; and  
said corresponding fast transform comprises a fast Fourier transform.

88. A method as claimed in claim 86, wherein:  
said set of fast transform basis functions comprise a set of Hadamard transform basis functions; and  
said corresponding fast transform comprises a fast Hadamard transform.

89. A method as claimed in claim 86, wherein:  
said set of fast transform basis functions comprise a set of Kronecker transform basis functions; and  
said corresponding fast transform comprises a fast Kronecker transform.

90. A method as claimed in claim 83, further comprising the step of:



initializing each base spreading weight vector of said plurality of base spreading weight vectors in response to an initiation signal transmitted from said corresponding remote unit.

5 91. A method as claimed in claim 90, wherein said initializing step occurs before said spreading step.

92. A method as claimed in claim 83, wherein the step of detecting at each remote unit further comprises the steps of:

10 decomposing said preamble portion of said input data matrix into a first decomposition matrix and a second decomposition matrix; and

correlating said first decomposition matrix with said preamble corresponding to said remote unit to form a correlation vector.

15 93. A method as claimed in claim 92, wherein:  
said first decomposition matrix is substantially orthogonal and said second decomposition matrix is substantially upper triangular.

20 94. A method as claimed in claim 93, wherein the step of decomposing said preamble data matrix comprises a QR decomposition.

95. A method as claimed in claim 94, wherein said QR decomposition is calculated according to a recursive algorithm.

25 96. A method as claimed in claim 92, further comprising the step of:  
generating said remote unit despreading weight vector at each remote unit using said second decomposition matrix and said correlation vector.

30 97. A method as claimed in claim 83, further comprising the step of:  
updating said remote unit despreading weight vector at each remote unit using an adaptive algorithm.